



**CALIFORNIA STATE SCIENCE FAIR  
2002 PROJECT SUMMARY**

<b>Name(s)</b> <b>Anthony Polverini</b>	<b>Project Number</b>  <b>22475</b>
<b>Project Title</b> <b>How Does the Time of Day Affect Solar Energy Conversion using Ruthenium tris-bypridine</b>	
<b>Abstract</b> <b>Objectives/Goals</b> The objective behind this project was to find a way to produce hydrogen from sunlight. Ruthenium tris-bypridine is a catalyst which can be used (with the correct chemicals) to create hydrogen. The purpose of this experiment was to find other types of creating fuels so we can lose our dependancy toward petroleum products.I wanted to find how much this experimental chemical could point us in another direction away from petroleum. My goal, in the end, was to eventually be able to produce hydrogen, and a more effective system of gathering hydrogen from sunlight alone. <b>Methods/Materials</b> The materials behind the experiment help make the method easier to understand. I used: Ruthenium tris-bypridine=(Ru(bpy)), methyl-violigen=(mv), and Ethylene Diamene Tetraacidic Acid=(EDTA). All these chemicals work together to form the hydrogen. The (Ru(bpy)) gathers sunlight and becomes excited from the photons, the (mv) takes an electron away and give is to the (EDTA). Lastly, the (EDTA) gives it's electron to a Platinum catalyst which in turn, through the chemical process, makes hydrogen. In order to test the amount of possible changed hydrogen, I used a Spectrophotometer to see how much the Ruthenium changed because (Ru(bpy)) changes color proportionally to how much (mv) is changed in the electron swapping. The spectrophotometer then measures the energy in a specific wavelength. This then explains how much hydrogen would've been created <b>Results</b> The results of the experiment was a success. Enough methyl-violigen was changed to create hydrogen. This was due to the fact that enough (mv) was changed to make a significant impact on the spectrophotometer. The results showed that the time of day, and the amount of exposure, had a great impact on the amount of (mv) changed. My original hypothesis was correct. The time of day had a large impact on the possible hydrogen amount. The data also showed that without (Ru(bpy)) the experiment couldn't work, the (mv) and (EDTA) alone, couldn't produce hydrogen. <b>Conclusions/Discussion</b> In conclusion, with enough research, (Ru(bpy)) could be used as a wonderful catalyst for production of hydrogen. The experiment was a success proving that this is definently a plausible source for hydrogen. I hope that this chemical gets the attention it deserves because I feel in the near future, we'll be needing it.	
<b>Summary Statement</b> My project is about how Ruthenium tris-bipyridene can be used for making hydrogen from sunlight, and how the time of day effects the hydrogen conversion.	
<b>Help Received</b> Used lab equipment at CalTech; was under the supervision of Dr.Gray	